# V&V Reference Report
# L2 ASCDS Version : 10.1.1

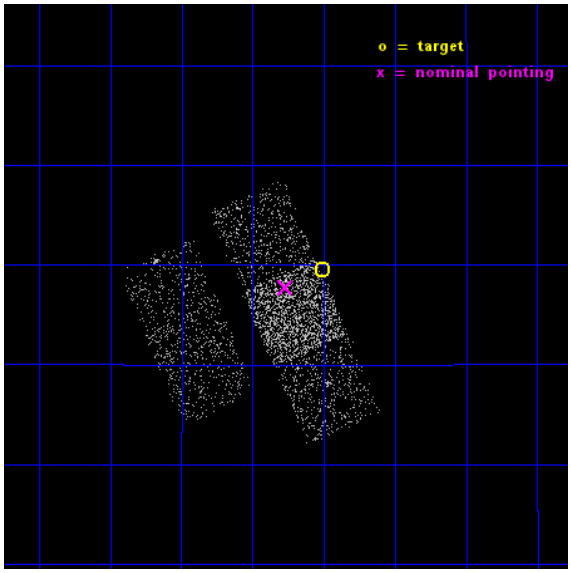
Observation 15673 - L2 Version 3
Chandra X-Ray Center

L2 Processing Date : Dec 7 2014

## Contents

# 1 Front

| | | |
|---|---|---|
| seq_num | 100102 | Sequence number |
| obs_id | 15673 | Observation id |
| title | Plumbing the Heights of the Solar Wind With Comet ISON | Proposal ti |
| observer | Dr. Carey Lisse | Principal investigator |
| object | Comet C/2012 S1 (ISON) | Source name |
| dtycycle | 0 |   |
| cycle | P | events from which exps? Prim/Second/Both |
| ra_targ | 167.12802 | Observer's specified target RA [deg] |
| dec_targ | 6.82638 | Observer's specified target Dec [deg] |
| ra_nom | 167.19233629035 | Nominal RA [deg] |
| dec_nom | 6.7957825818398 | Nominal Dec [deg] |
| roll_nom | 66.360859559174 | Nominal Roll [deg] |
| revision | 3 | Processing version of data |
| ontime | 4615.1741918921 | Sum of GTIs [s] |
| livetime | 4554.8735434333 | Livetime [s] |
| ontime2 | 4615.0100318789 | Sum of GTIs [s] |
| ontime3 | 4615.0921118855 | Sum of GTIs [s] |
| ontime6 | 4615.1331518888 | Sum of GTIs [s] |
| ontime7 | 4615.1741918921 | Sum of GTIs [s] |
| ontime8 | 4615.0510718822 | Sum of GTIs [s] |
| l2events | 3904 | Number of level 2 events |

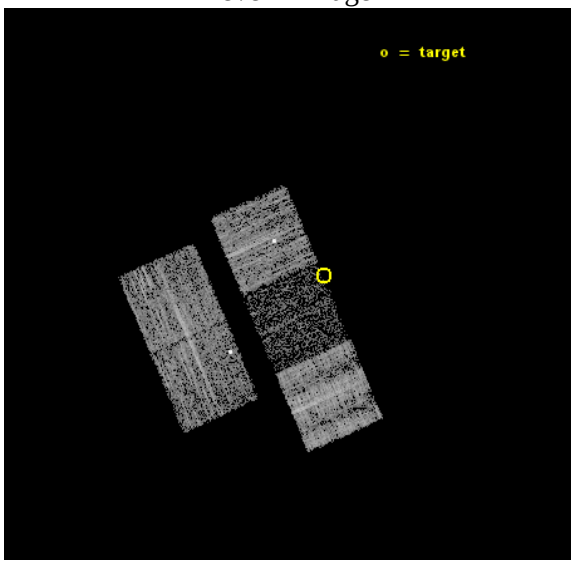


# 2 OBI

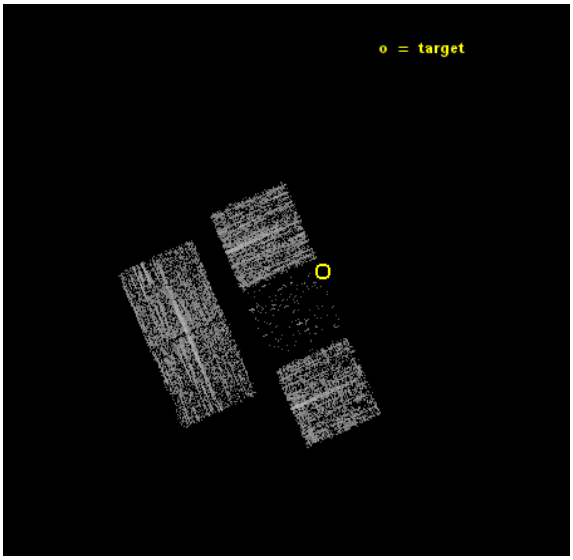
## 2.1 OBI

### 2.1.1 Images

Level 1 Image

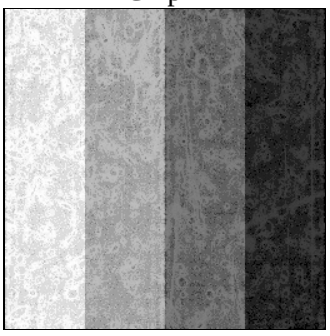



Level 1 Bad Events

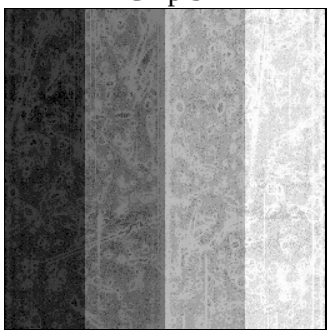



### 2.1.2 Bias

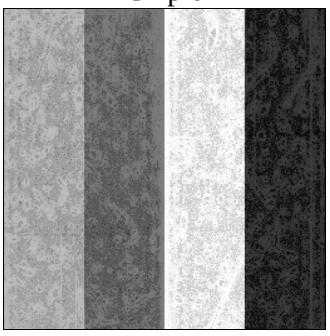
Chip 2



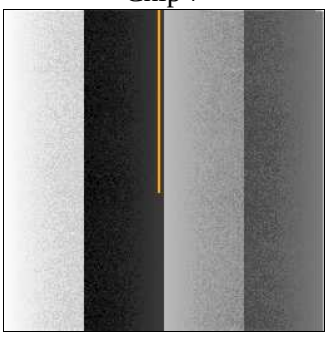
Chip 3



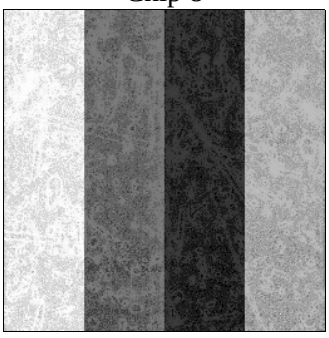
Chip 6



Chip 7



Chip 8



### 2.1.3 Parameters

| | | |
|---|---|---|
| obi_num | 0 | Obi number |
| ascdsver | 10.3.1 | Processing system revision |
| caldbver | 4.6.4 |   |
| date | 2014-12-07T19:56:24 | Date and time of file creation |
| revision | 3 | Processing version of data |

| | | |
|---|---|---|
| sched_exp_time | 4500.000000 | [s] Scheduled observation exposure time |
| ontime | 4615.1741918921 | Sum of GTIs [s] |
| ontime2 | 4615.0100318789 | Sum of GTIs [s] |
| ontime3 | 4615.0921118855 | Sum of GTIs [s] |
| ontime6 | 4615.1331518888 | Sum of GTIs [s] |
| ontime7 | 4615.1741918921 | Sum of GTIs [s] |
| ontime8 | 4615.0510718822 | Sum of GTIs [s] |
| l1events | 69573 | Number of level 1 events |

### 2.1.4 Events

| | ccd 2 | ccd 3 | ccd 6 | ccd 7 | ccd 8 |
|---|---|---|---|---|---|
| level 1 events | 14746 | 13618 | 16480 | 3176 | 21553 |
| rejected events | 13943 | 11621 | 14276 | 1004 | 12519 |
| rejected % | 94% | 85% | 86% | 31% | 58% |

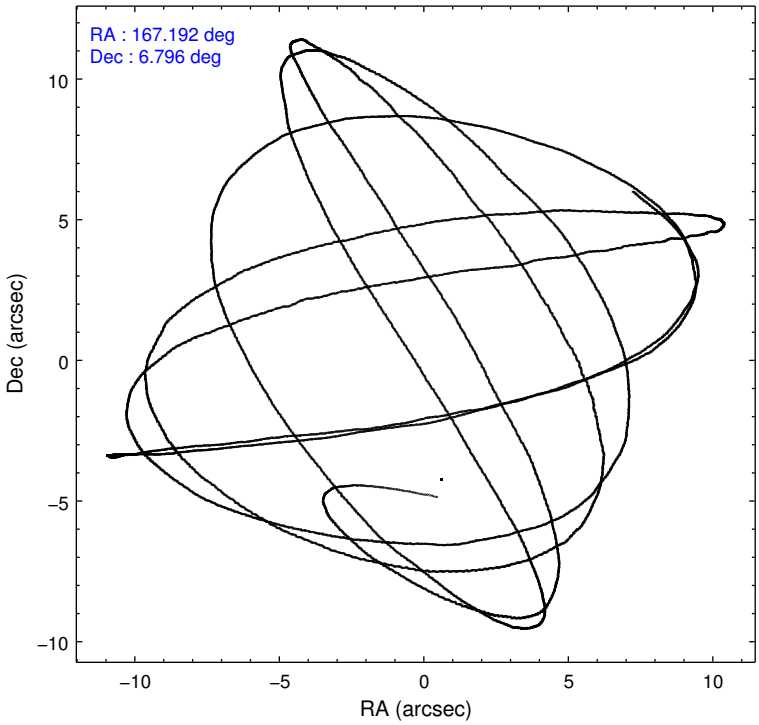
| | ccd 2 | ccd 3 | ccd 6 | ccd 7 | ccd 8 |
|---|---|---|---|---|---|
| grade 0 events | 398 | 1751 | 1886 | 659 | 3315 |
| | 2% | 12% | 11% | 20% | 15% |
| grade 1 events | 9 | 10 | 18 | 32 | 24 |
| | 0% | 0% | 0% | 1% | 0% |
| grade 2 events | 201 | 64 | 153 | 770 | 1540 |
| | 1% | 0% | 0% | 24% | 7% |
| grade 3 events | 83 | 96 | 88 | 257 | 1463 |
| | 0% | 0% | 0% | 8% | 6% |
| grade 4 events | 87 | 79 | 90 | 261 | 1332 |
| | 0% | 0% | 0% | 8% | 6% |
| grade 5 events | 26 | 17 | 15 | 109 | 139 |
| | 0% | 0% | 0% | 3% | 0% |
| grade 6 events | 57 | 64 | 54 | 281 | 1706 |
| | 0% | 0% | 0% | 8% | 7% |
| grade 7 events | 13885 | 11537 | 14176 | 807 | 12034 |
| | 94% | 84% | 86% | 25% | 55% |

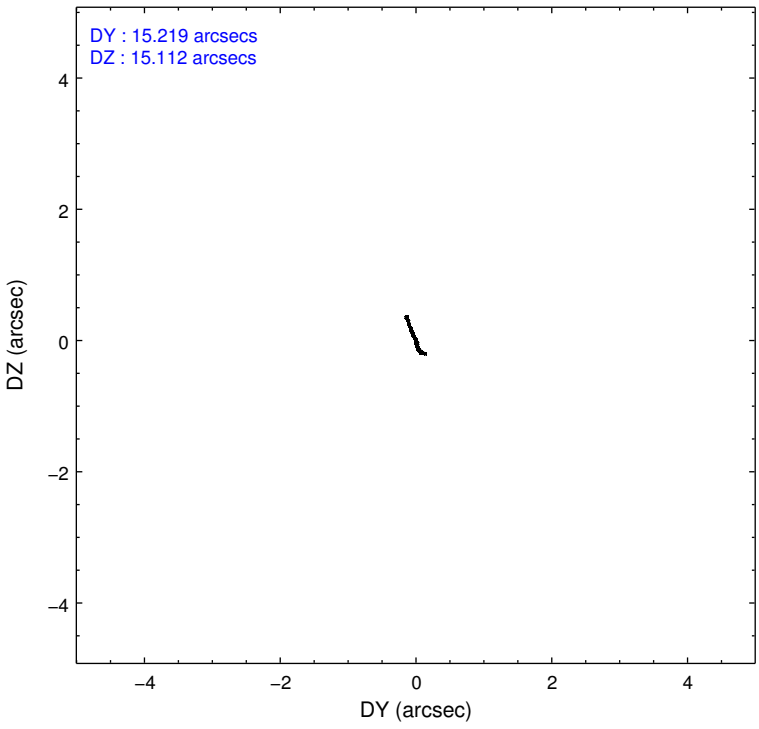
## 2.2 Compared Parameters

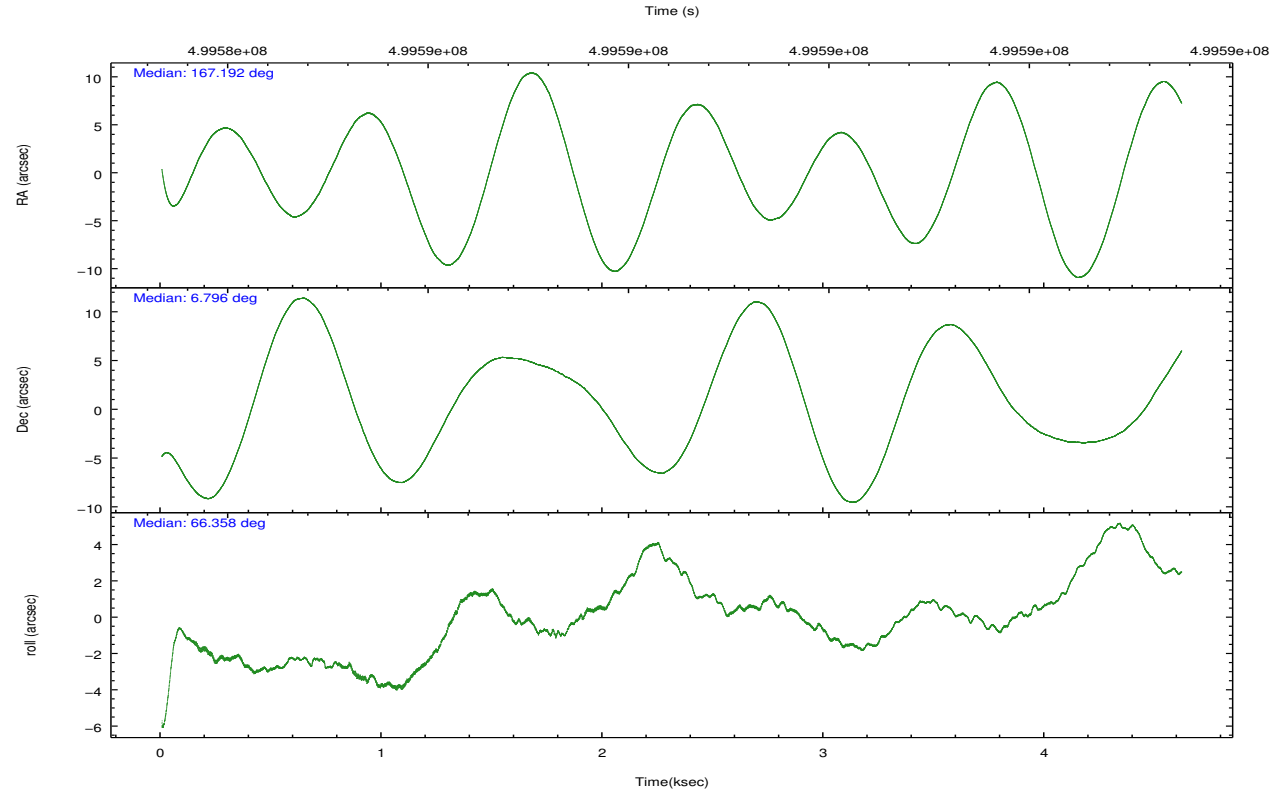
| Parameter | Planned | Actual |
|---|---|---|
| Instrument | ACIS | ACIS |
| Detector | ACIS-23678 | ACIS-23678 |
| Grating | NONE | NONE |
| Data mode | VFAINT | VFAINT |
| Observation mode | POINTING | POINTING |
| [deg] Pointing RA | 167.195707 | 167.1923362903476 |
| [deg] Pointing Dec | 6.768764 | 6.795782581839751 |
| [deg] Pointing Roll | 66.203860 | 66.36085955917409 |
| [mm] SIM focus pos | -0.684267 | -0.6828225247311905 |
| [mm] SIM defocus | 0 | 0.001444936568705701 |
| [mm] SIM translation stage pos | -190.132523 | -190.1425803651734 |
| [mm] SIM translation stage offset | 0 | 0.01005778216563158 |
| [s] Observation start time (MET) | 499585020.184000 | 499583758.33879 |
| Observation start date | 2013-10-31T05:35:53 | 2013-10-31T05:15:58 |
| [s] Observation end time (MET) | 499589520.184000 | 499589654.13911 |
| Observation end date | 2013-10-31T06:50:53 | 2013-10-31T06:54:14 |
| Read mode | TIMED | TIMED |

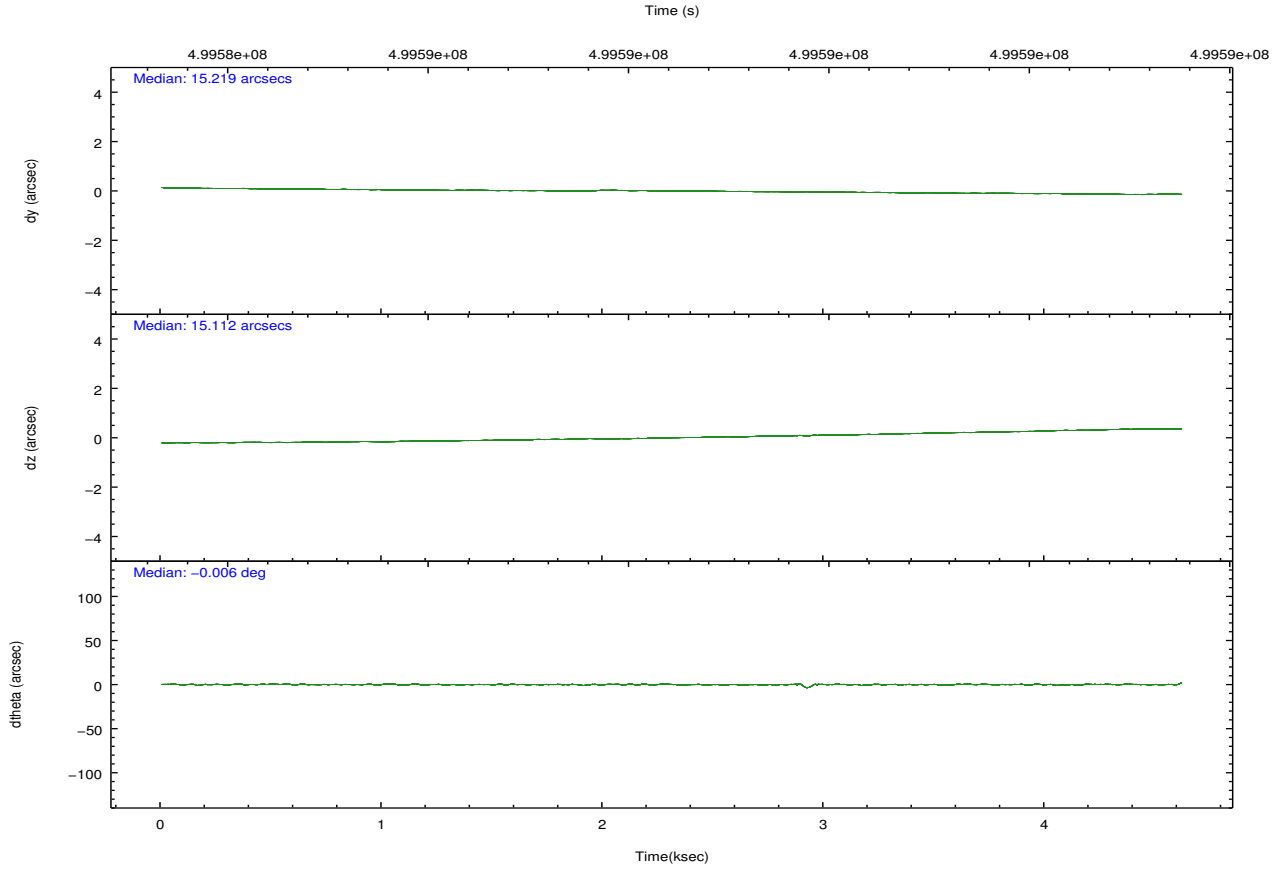
| Parameter | Planned | Actual |
|---|---|---|
| Obspar format version number | 7 | 7 |
| Obspar file type | PREDICTED | ACTUAL |
| Obspar update status | NONE | UPDATED |
| Number of optional ACIS chips dropped | 0 | 0 |
| On-chip summing requested | N | N |
| Subarray requested | NONE | NONE |
| Alternating exposures requested | N | N |
| [s] Primary exposure time | 0.000000 | 3.1 |

## 2.3 Aspect


RA : 167.192 deg
Dec : 6.796 deg
Dec (arcsec)
RA (arcsec)
10
5
0
−5
−10
−10
−5
0
5
10


DY : 15.219 arcsecs
DZ : 15.112 arcsecs
DZ (arcsec)
DY (arcsec)
4
2
0
−2
−4
−4
−2
0
2
4


Time (s)
4.9958e+08
4.9959e+08
4.9959e+08
4.9959e+08
4.9959e+08
4.9959e+08
Median: 167.192 deg
RA (arcsec)
Median: 6.796 deg
Dec (arcsec)
Median: 66.358 deg
roll (arcsec)
Time(ksec)

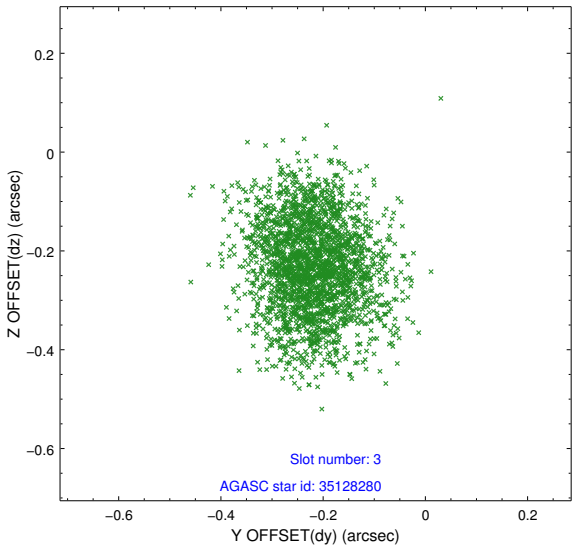

Time (s)
4.9958e+08
4.9959e+08
4.9959e+08
4.9959e+08
4.9959e+08
4.9959e+08
Median: 15.219 arcsecs
dy (arcsec)
Median: 15.112 arcsecs
dz (arcsec)
Median: −0.006 deg
dtheta (arcsec)
Time(ksec)

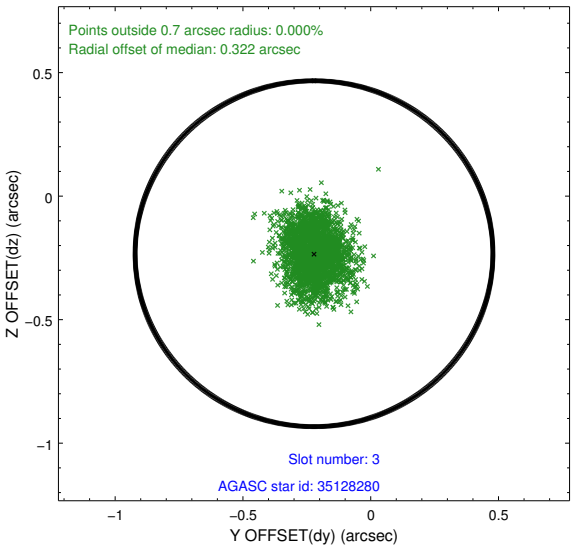
Slot Statistics

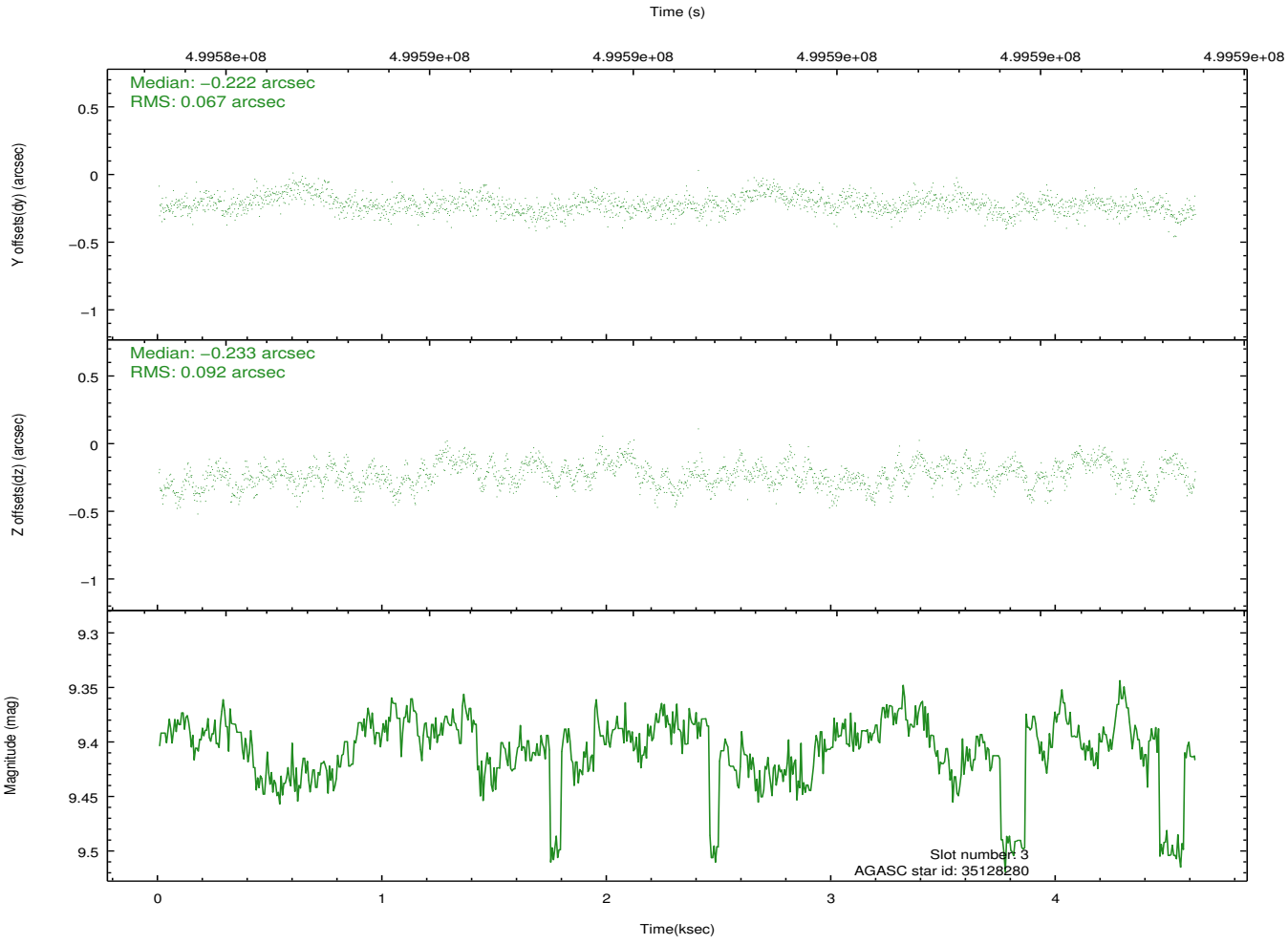
| slot | status | used | id | mag | n_pts | med_dy | med_dz | dr1 | dr2 | ra | dec | mean_y | mean_z |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 0 | FID | | ACIS-S-1 | 7.16 | 1126 | 0.016 | -0.030 | 0.010 | 0.018 | 0.000000 | 0.000000 | 927.89 | -1732.13 |
| 1 | FID | | ACIS-S-4 | 7.17 | 1126 | 0.174 | 0.018 | 0.009 | 0.013 | 0.000000 | 0.000000 | 2146.16 | 170.72 |
| 2 | FID | | ACIS-S-5 | 7.19 | 1126 | -0.217 | 0.025 | 0.007 | 0.013 | 0.000000 | 0.000000 | -1819.54 | 165.78 |
| 3 | GUIDE | used | 35128280 | 9.40 | 2251 | -0.222 | -0.233 | 0.123 | 0.197 | 167.246023 | 6.904426 | 519.78 | 32.94 |
| 4 | GUIDE | used | 35129704 | 9.38 | 2249 | 0.323 | 0.200 | 0.126 | 0.200 | 167.497145 | 6.165570 | -1550.24 | -1862.74 |
| 5 | GUIDE | used | 35260640 | 9.07 | 2252 | 0.141 | 0.142 | 0.096 | 0.156 | 167.546632 | 6.305790 | -1018.22 | -1821.06 |
| 6 | GUIDE | used | 111150824 | 9.08 | 2246 | -0.459 | -0.397 | 0.118 | 0.181 | 166.841315 | 7.513076 | 1940.40 | 2238.47 |
| 7 | GUIDE | used | 35129920 | 10.00 | 2251 | 0.234 | 0.285 | 0.178 | 0.294 | 167.078249 | 6.112078 | -2331.33 | -567.10 |

## 2.4 Star Slots

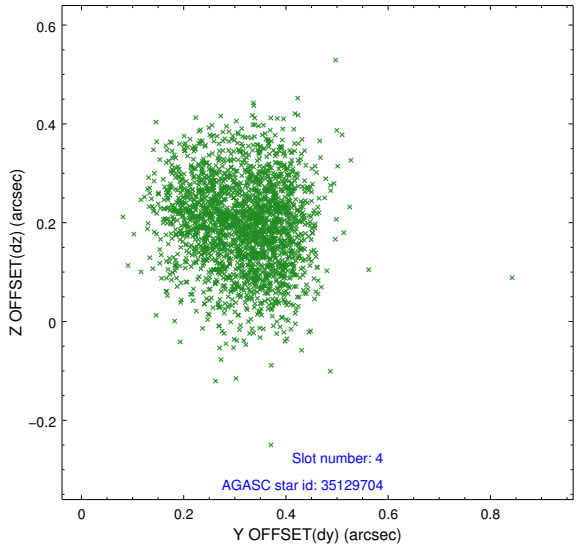
### 2.4.1 Slot 3

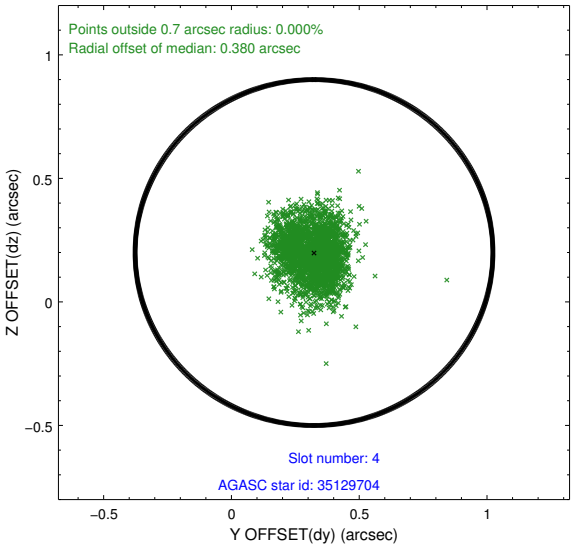


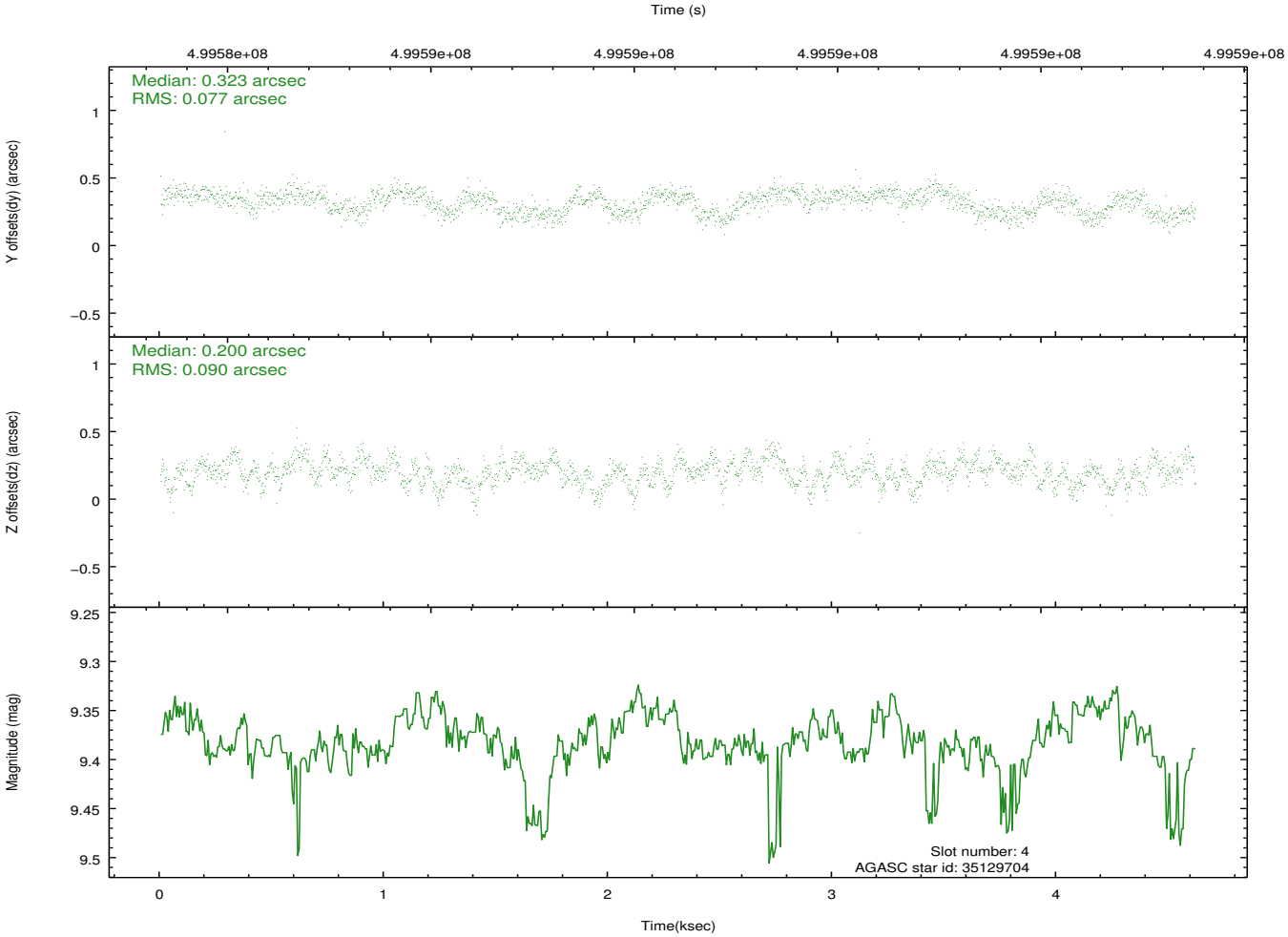



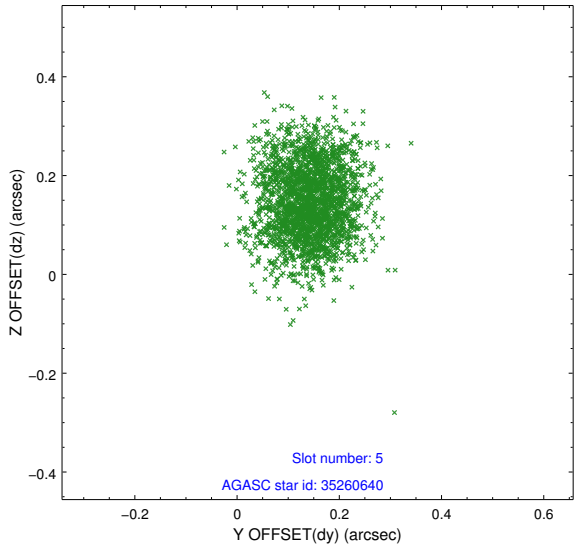
### 2.4.2 Slot 4

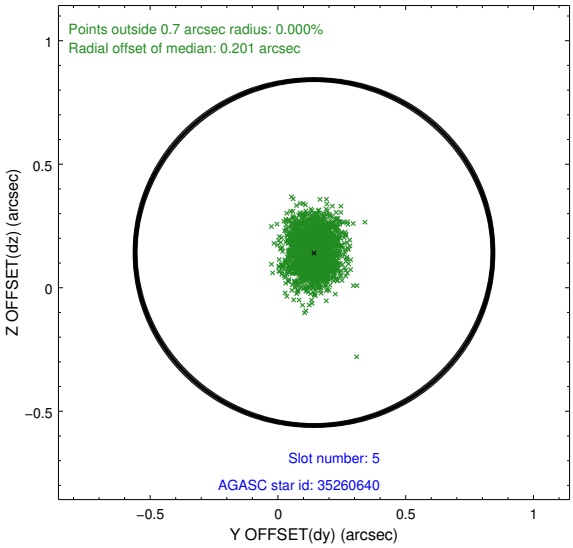

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 4
AGASC star id: 35129704

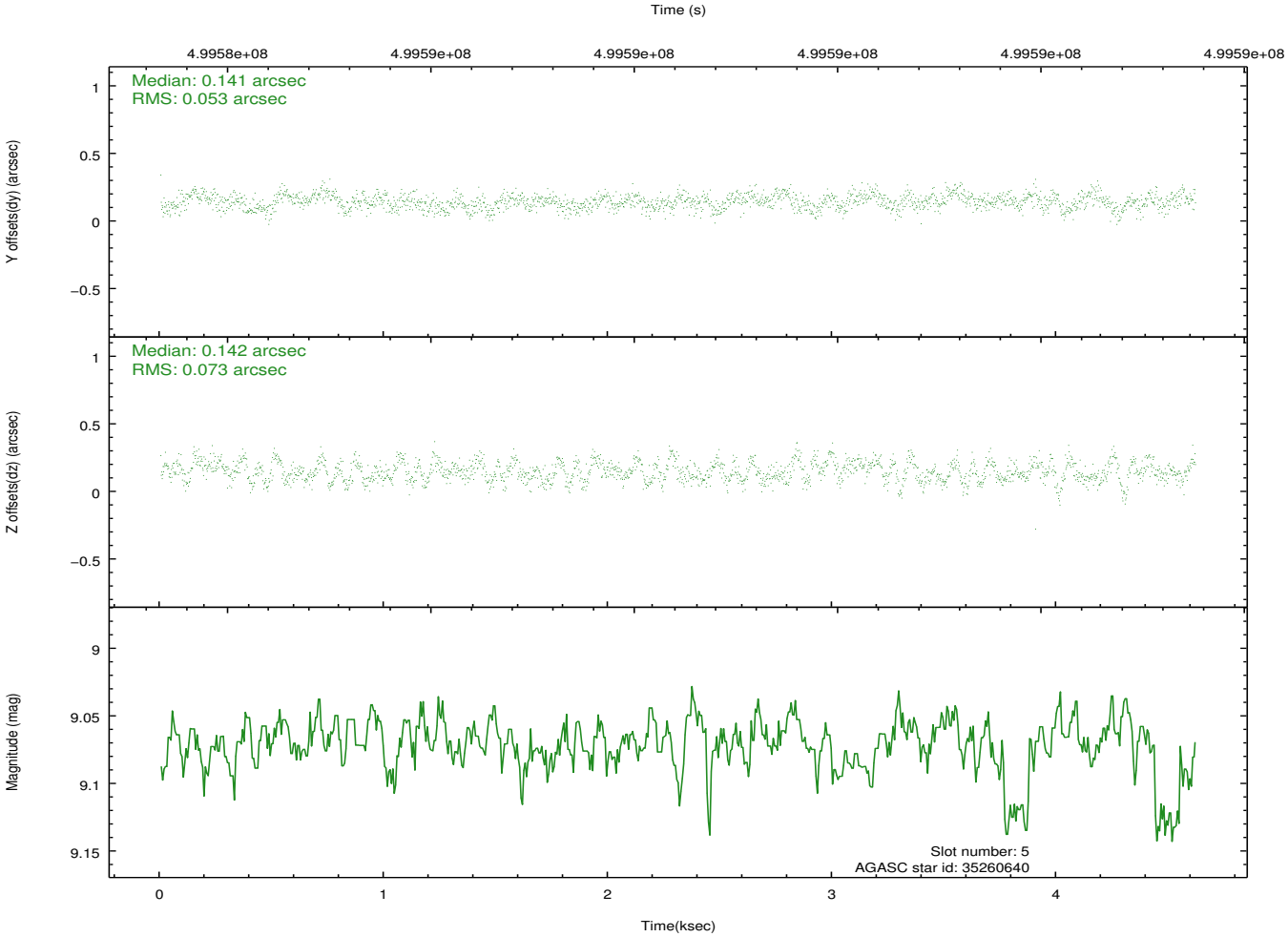

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.380 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 4
AGASC star id: 35129704


Time (s)
Median: 0.323 arcsec
RMS: 0.077 arcsec
Y offsets(dy) (arcsec)
Median: 0.200 arcsec
RMS: 0.090 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 4
AGASC star id: 35129704
Time(ksec)

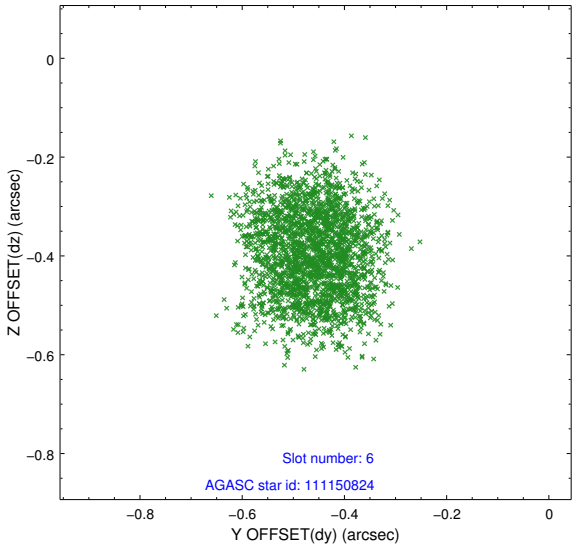
### 2.4.3 Slot 5

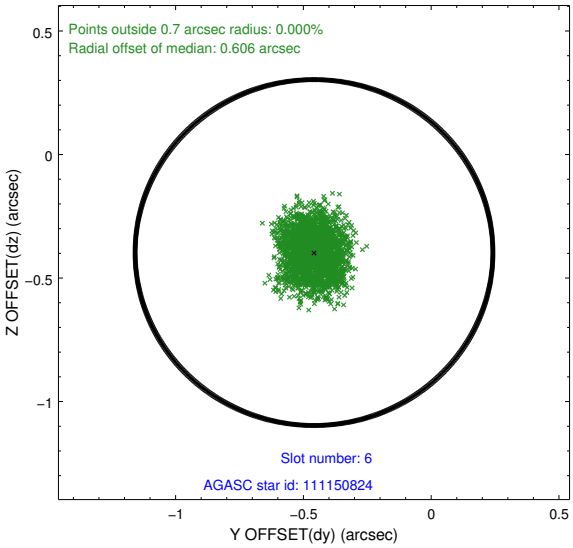

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 5
AGASC star id: 35260640

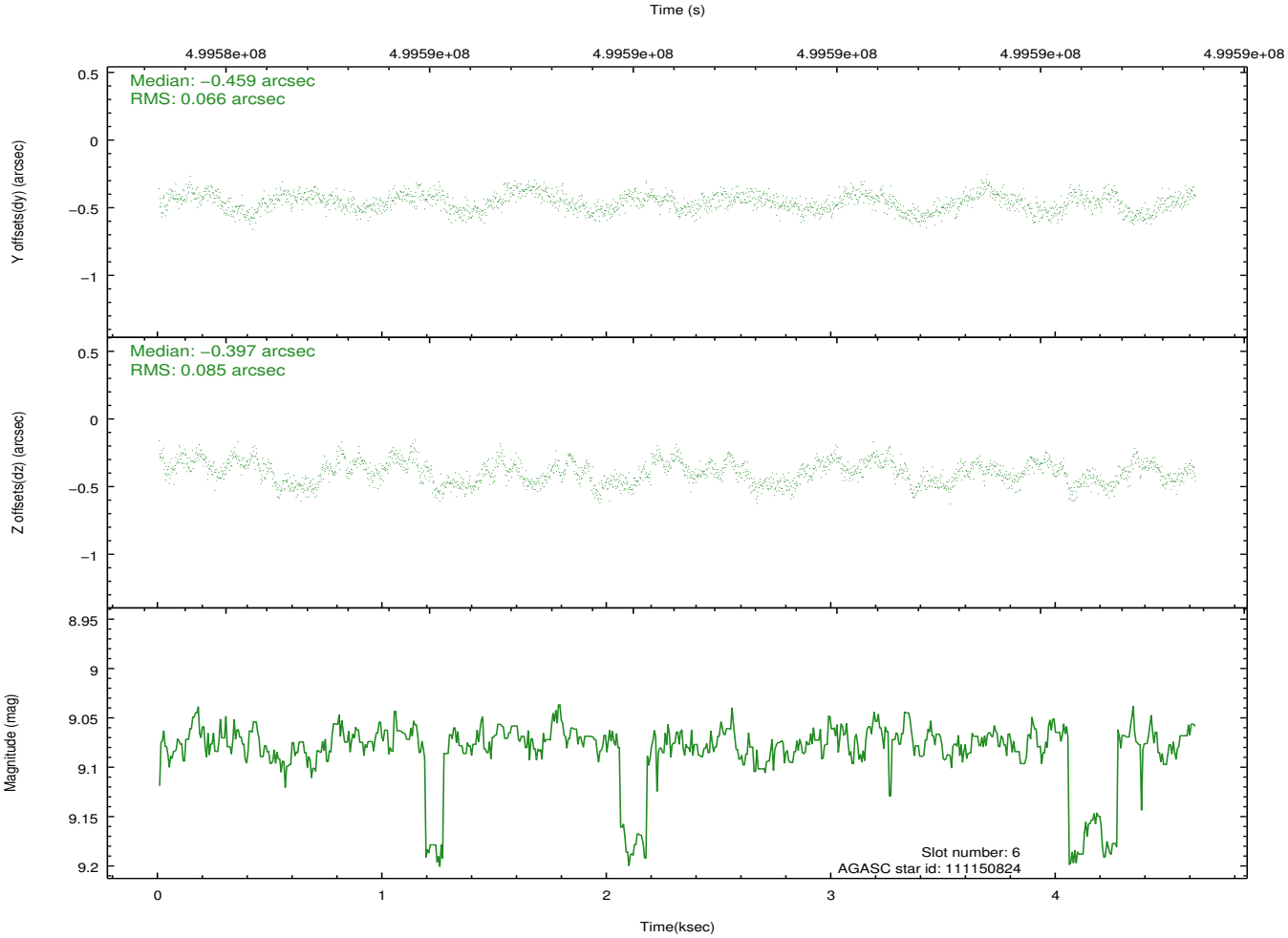

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.201 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 5
AGASC star id: 35260640


Time (s)
Median: 0.141 arcsec
RMS: 0.053 arcsec
Y offsets(dy) (arcsec)
Median: 0.142 arcsec
RMS: 0.073 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 5
AGASC star id: 35260640
Time(ksec)

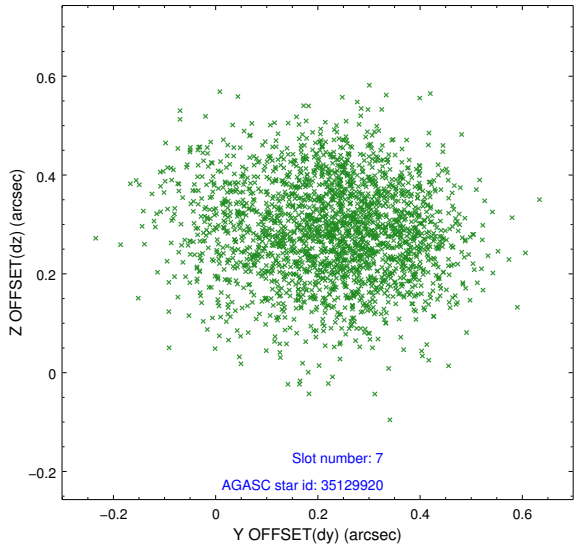
### 2.4.4 Slot 6

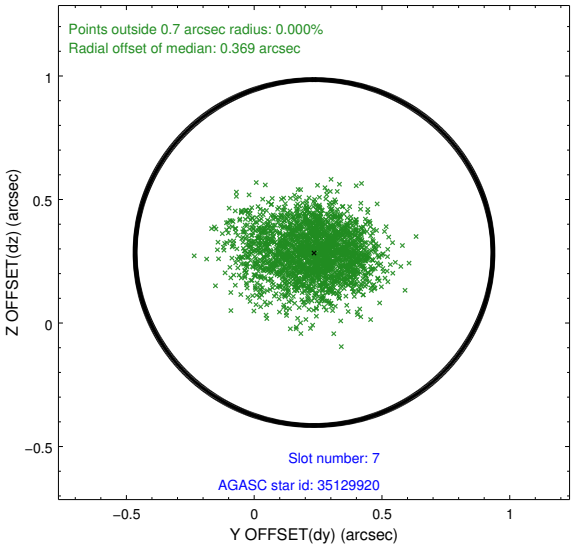

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 6
AGASC star id: 111150824

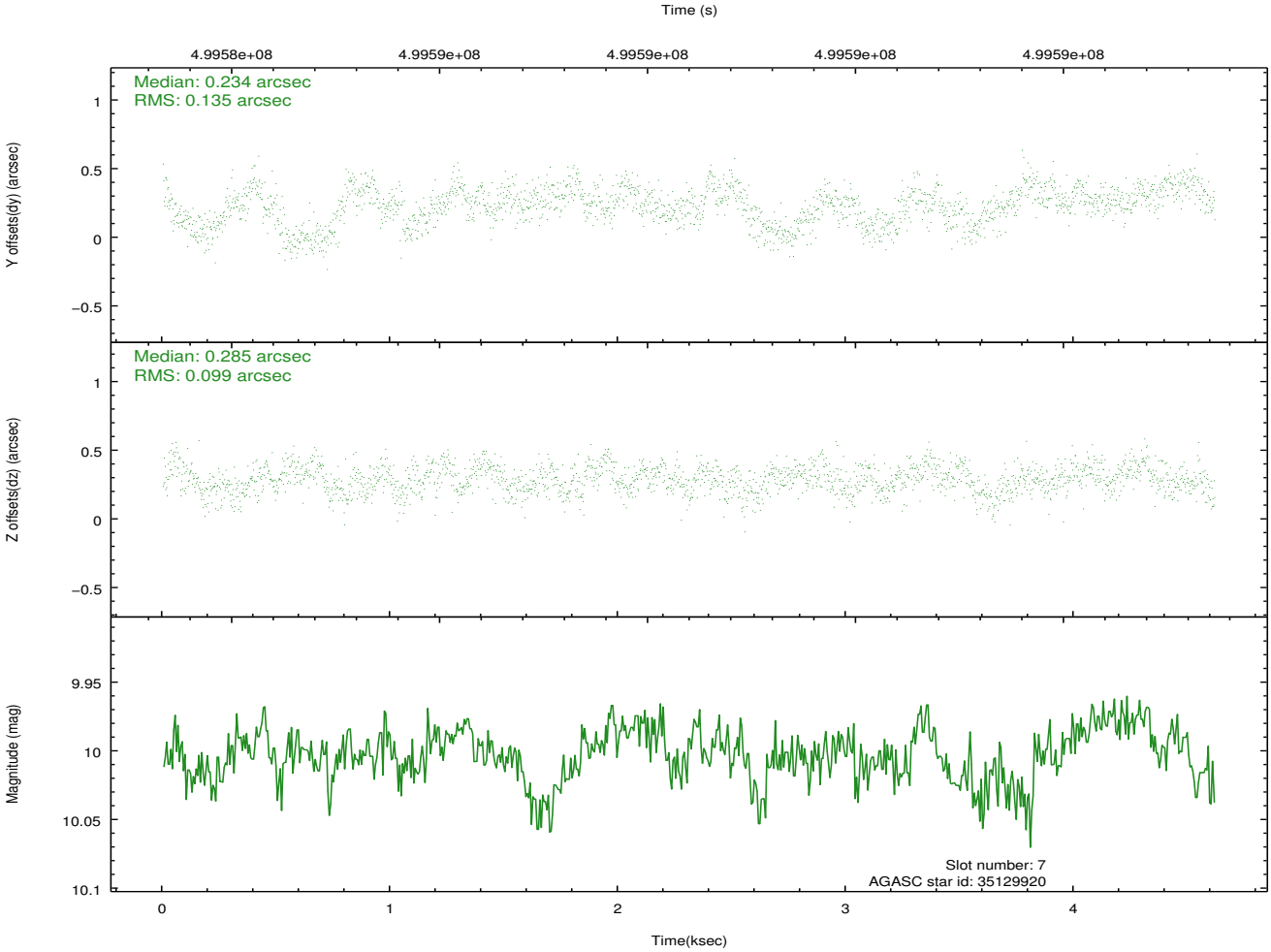

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.606 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 6
AGASC star id: 111150824


Time (s)
Median: −0.459 arcsec
RMS: 0.066 arcsec
Y offsets(dy) (arcsec)
Median: −0.397 arcsec
RMS: 0.085 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 6
AGASC star id: 111150824
Time(ksec)

### 2.4.5 Slot 7

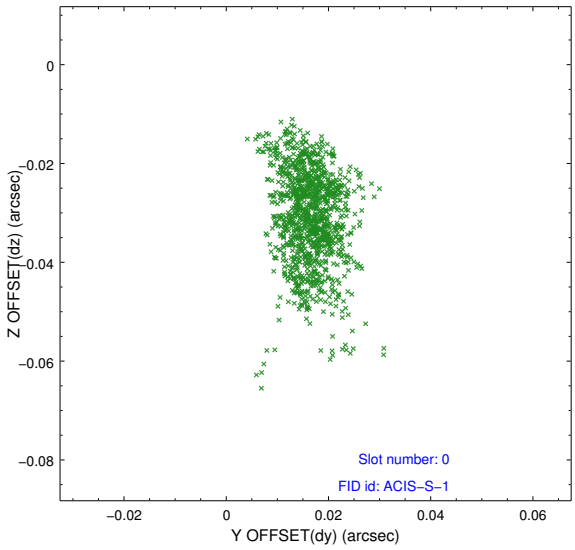

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 7
AGASC star id: 35129920

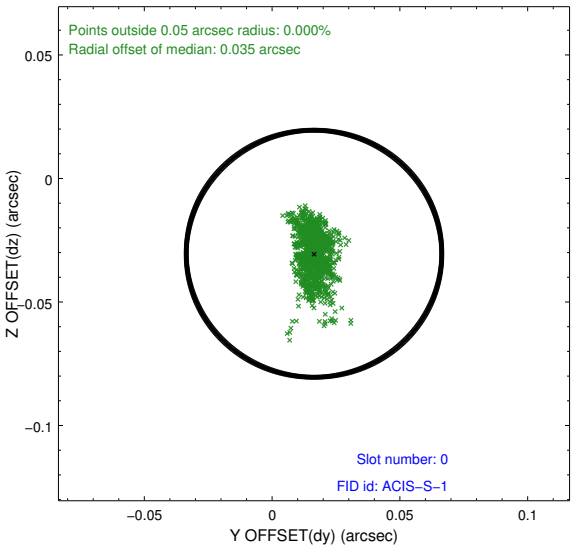

Points outside 0.7 arcsec radius: 0.000%
Radial offset of median: 0.369 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 7
AGASC star id: 35129920

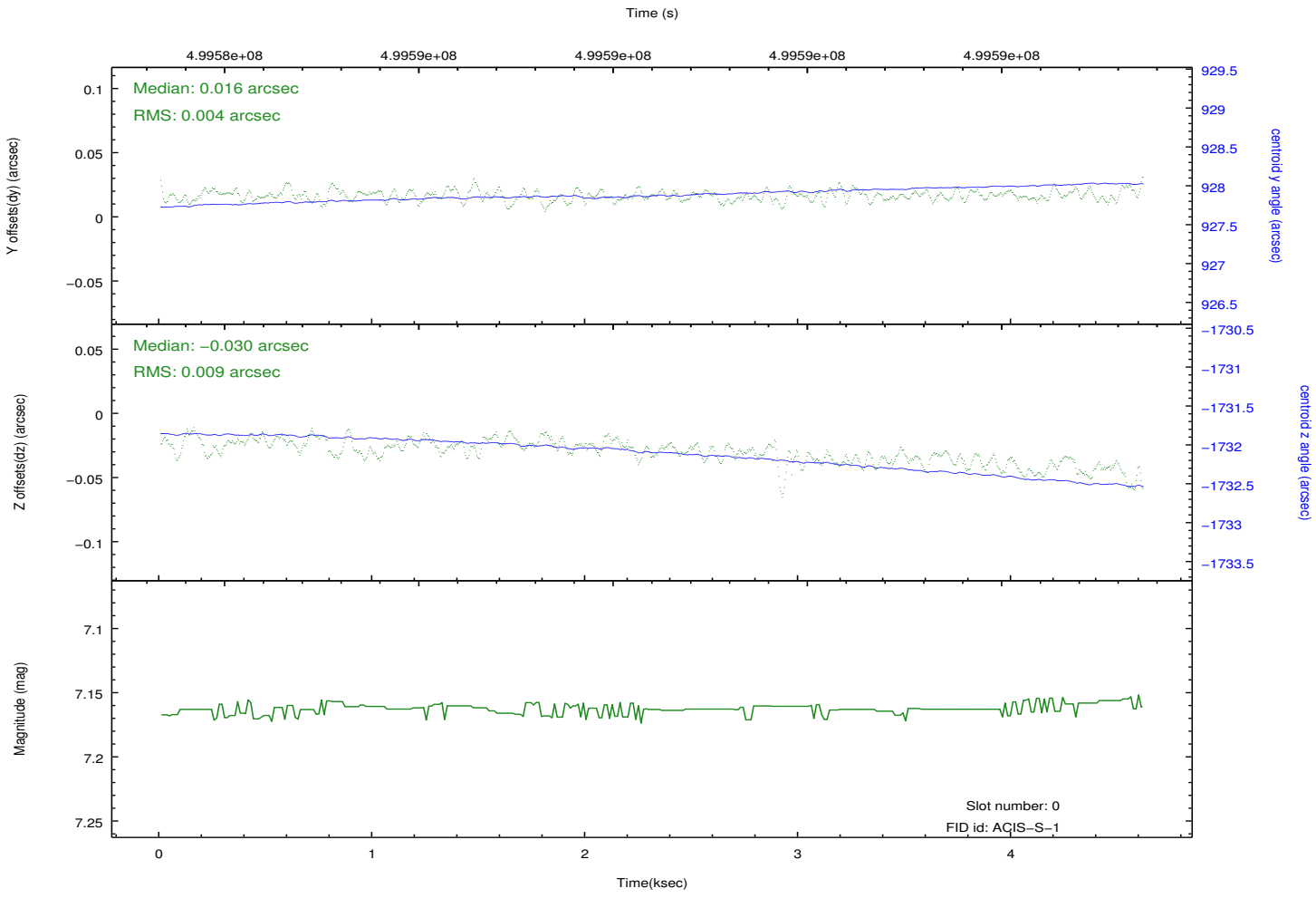

Time (s)
4.9958e+08
4.9959e+08
4.9959e+08
4.9959e+08
4.9959e+08
Median: 0.234 arcsec
RMS: 0.135 arcsec
Y offsets(dy) (arcsec)
Median: 0.285 arcsec
RMS: 0.099 arcsec
Z offsets(dz) (arcsec)
Magnitude (mag)
Slot number: 7
AGASC star id: 35129920
Time(ksec)

## 2.5 FID Slots

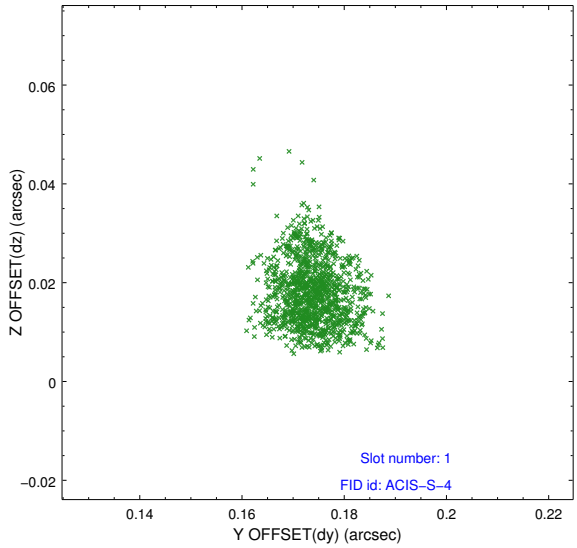
### 2.5.1 Slot 0

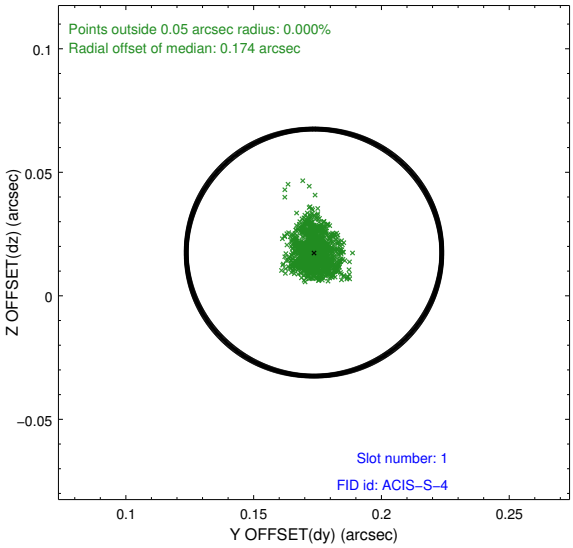


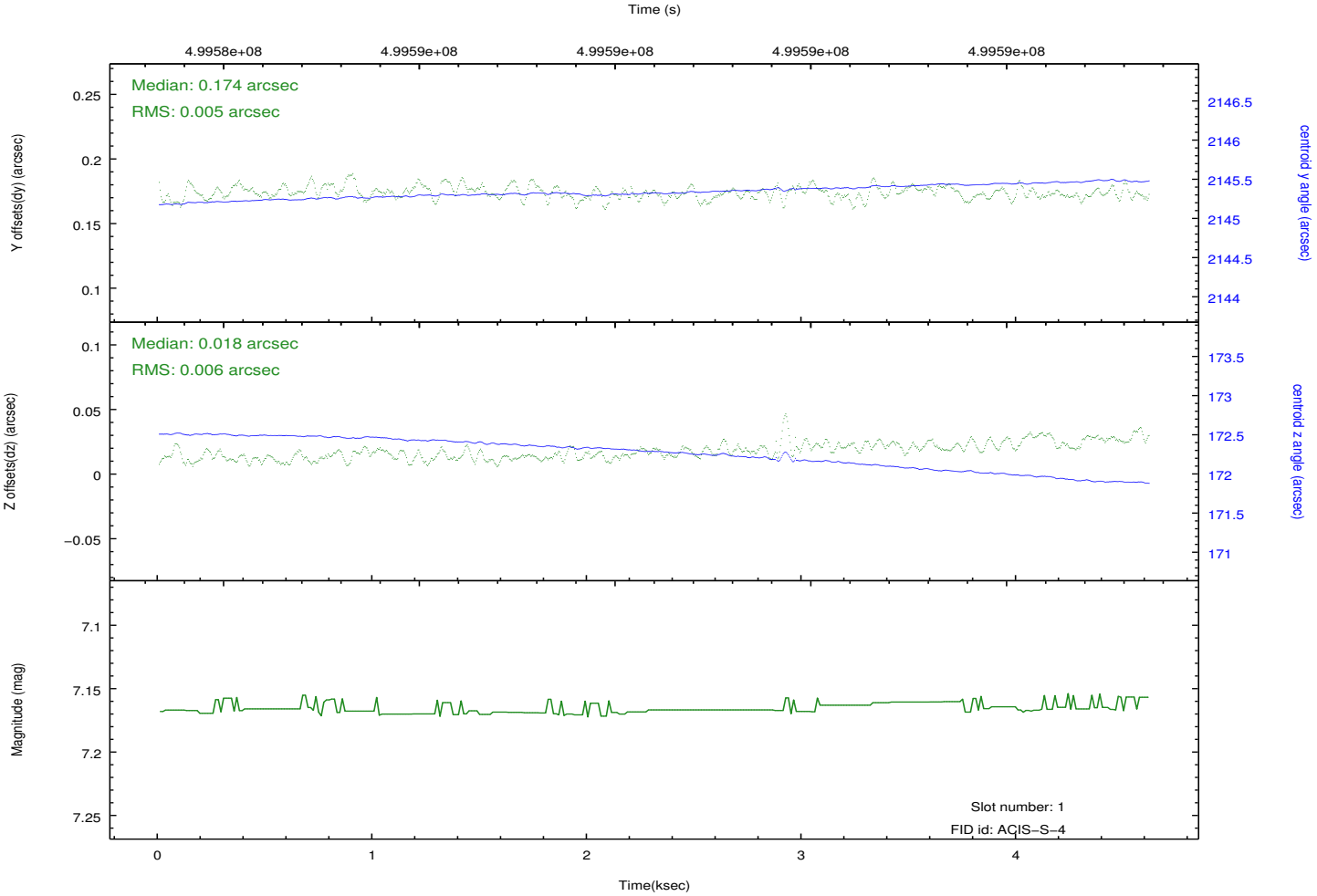



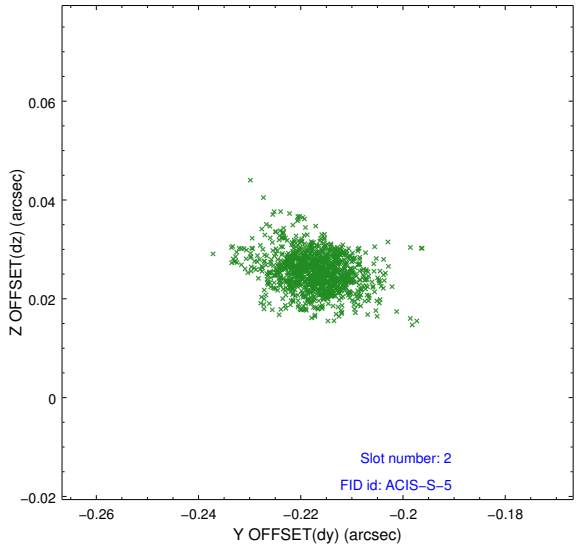
### 2.5.2 Slot 1

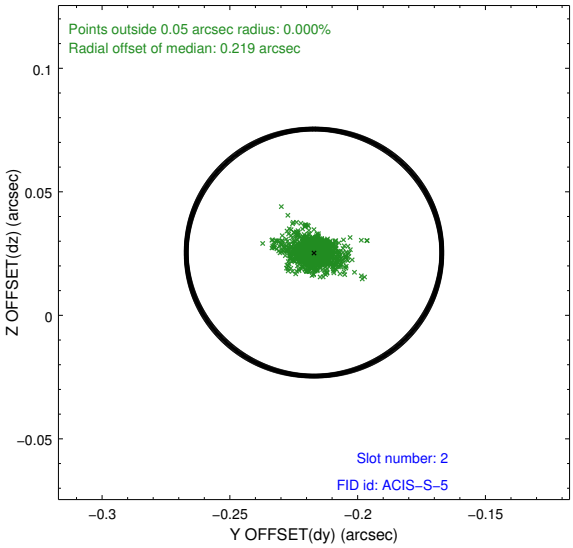

Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 1
FID id: ACIS−S−4

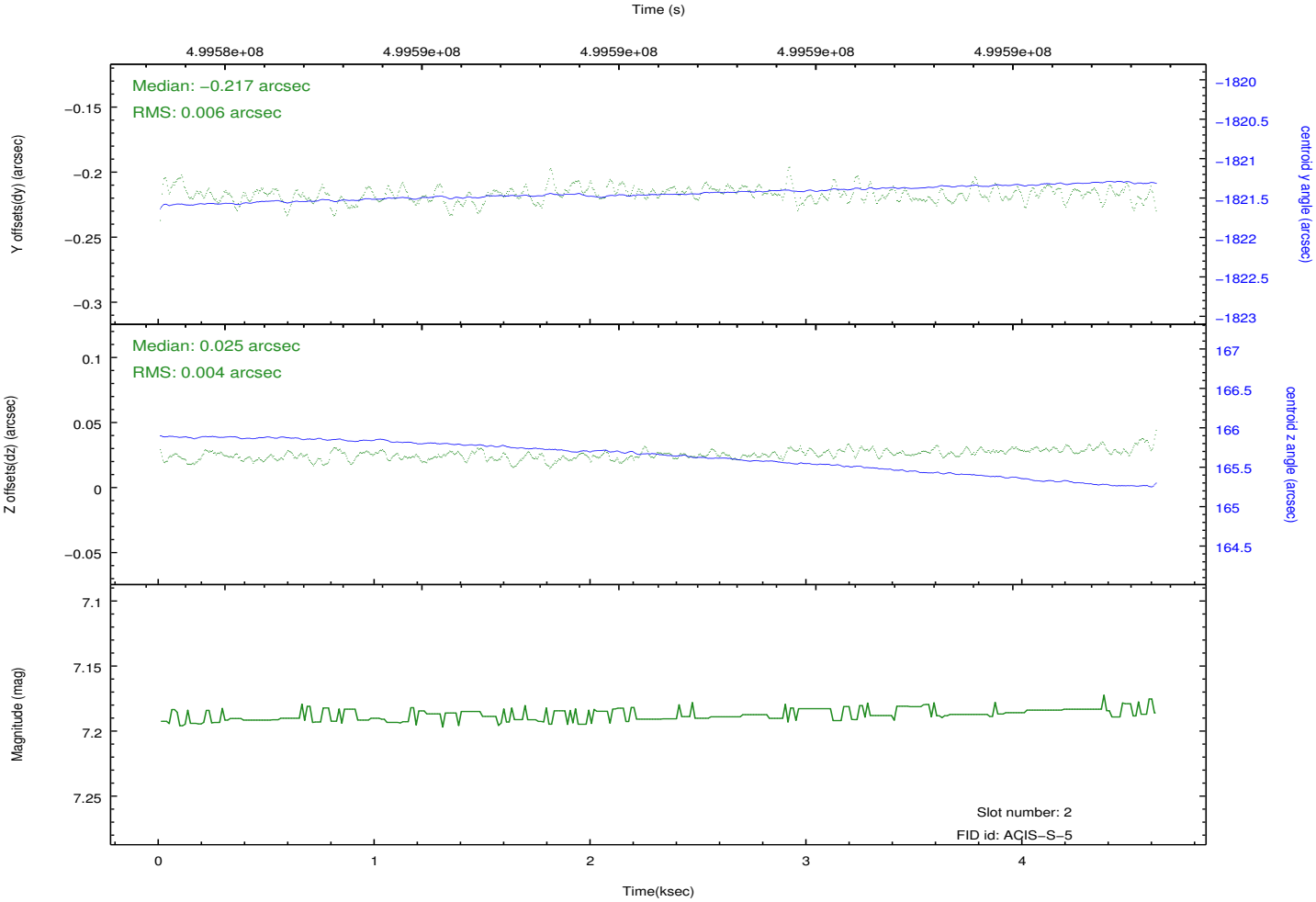

Points outside 0.05 arcsec radius: 0.000%
Radial offset of median: 0.174 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 1
FID id: ACIS−S−4


Time (s)
Median: 0.174 arcsec
RMS: 0.005 arcsec
Y offsets(dy) (arcsec)
centroid y angle (arcsec)
Median: 0.018 arcsec
RMS: 0.006 arcsec
Z offsets(dz) (arcsec)
centroid z angle (arcsec)
Magnitude (mag)
Slot number: 1
FID id: ACIS−S−4
Time(ksec)

### 2.5.3 Slot 2


Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 2
FID id: ACIS−S−5


Points outside 0.05 arcsec radius: 0.000%
Radial offset of median: 0.219 arcsec
Z OFFSET(dz) (arcsec)
Y OFFSET(dy) (arcsec)
Slot number: 2
FID id: ACIS−S−5


Time (s)
Median: −0.217 arcsec
RMS: 0.006 arcsec
Y offsets(dy) (arcsec)
centroid y angle (arcsec)
Median: 0.025 arcsec
RMS: 0.004 arcsec
Z offsets(dz) (arcsec)
centroid z angle (arcsec)
Magnitude (mag)
Slot number: 2
FID id: ACIS−S−5
Time(ksec)

# A Summary

## A.1 Status

| | |
|---|---|
| V&V Scientist | Jen Lauer |
| V&V Date (YYYY-MM-DD) | 2014.12.15 |
| V&V Edition | 1 |
| V&V Disposition and Status | OK |
| V&V Charge Time | 4.6151741918921 |

## A.2 Comments

```
This is a moving target. Users will need to run sso_freeze or similar
software to position the events in the reference frame of the target.
==========
These data have been reprocessed with new aspect alignment calibration
files that correct small mean offsets (up to 0.4 arcsecs) and improve
overall astrometric accuracy. The new calibration was determined using
data from the time period being reprocessed and was performed using
cross-correlation of X-ray sources with radio and optical counterparts.
```